

**DEMOGRAPHIC AND REGIONAL DETERMINANTS OF PARTICIPATION  
IN SPECIFIC EXERCISE ACTIVITIES**

D. Stephen Nice, Ph.D.

and

Brock K. Kilbourne, Ph.D.

Health Psychology Department  
Naval Health Research Center  
P.O. Box 85122  
San Diego, CA 92138-9174

DTIC  
ELECTED  
SEP 30 1988

Report No. 88-19, supported in part by the Naval Military Personnel Command by work order No. N0002280WRRR503 and by the Naval Medical Research and Development Command, Department of the Navy. Dr. Kilbourne is a National Research Council post-doctoral associate at the Naval Health Research Center. The views presented are those of the authors and do not reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government. The authors gratefully acknowledge the assistance of Terry Conway, Linda Trent, and Susan Conway during all phases of this research.

## SUMMARY

### Problem

Although reliable information regarding participation in specific exercise activities would appear central to the formulation, implementation, and evaluation of health promotion policies, little is known of the determinants of exercise participation.

### Objective

The objective of the present study was to assess the regional and demographic determinants of the self-reported adoption and level of participation in specific exercise activities among U.S. Navy personnel.

### Approach

Participants were 3038 U.S. Navy active duty personnel who had been selected to participate in a Navy-wide evaluation of the Health and Physical Readiness Program. Questionnaires included self-report measures of the frequency and duration of 10 common exercise activities and a number of demographic variables including sex, age, race, education, and region.

### Results

Separate loglinear analyses were computed to assess associations between demographic factors and the adoption and level of participation in each of the 10 exercise activities. Results indicated that older people were less likely to adopt calisthenics, weightlifting, swimming, or baseball as exercise activities. Men were more likely to play basketball and jog, while women were more likely to participate in aerobics. Blacks were more likely than Whites to play basketball and do aerobics. (p) ←

Among those who participated in an activity at some level, analyses were computed to identify determinants of high versus low level of participation. Results indicated that age was negatively associated with the level of participation in calisthenics, weightlifting, and jogging. Blacks played more basketball than Whites or South Pacific Islanders, and Hispanics played more baseball. The only regional effect was that individuals in the Southwest spent more time walking. None of the interaction effects were significant.

### Conclusions

Age, sex, ethnicity, and region were associated with exercise activity. However, the present study found that different factors were associated with different measures of exercise participation (e.g., adoption and level of

participation) for specific exercise activities. These findings support the view that exercise participation is a complex and dynamic process and suggest that effective exercise programs should promote group-specific activities which are consistent with normative group preference patterns.

Accession Per	
NTIS GRA&I <input checked="" type="checkbox"/>	
DTIC TAB <input type="checkbox"/>	
Unannounced <input type="checkbox"/>	
Justification _____	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or
	Special

A-1



**Demographic and Regional Determinants of Participation  
in Specific Exercise Activities**

D. Stephen Nice, Ph.D.

and

Brock K. Kilbourne, Ph.D.

Although reliable information regarding participation in specific exercise activities would appear central to the formulation, implementation, and evaluation of health promotion policies, national surveys of exercise activity in the United States and in Canada have typically been characterized more by definitional and methodological diversity than by conceptual and empirical convergence (8,9). Despite difficulties in generalizing across studies, however, reviews of the literature on the epidemiology (9) and determinants (2) of leisure-time physical activity have documented a number of factors associated with activity level and have identified a variety of research priorities.

Across most U.S. and Canadian national surveys, there is general agreement that the leading physical activity choices include bicycling, bowling, calisthenics, jogging, softball, swimming, and walking (1,4,9,10.). Although there is consistent evidence that overall physical activity level is negatively associated with age (9,2,6) and positively associated with socioeconomic status (9), the relationships between regional and demographic factors and participation in specific physical activities remain largely unexplored.

Participation in specific physical activities may be viewed in terms of the adoption of a given activity, the intensity with which an adopted activity is performed, the level of participation (i.e., the product of frequency and duration), or the adherence to a given program of activity. Although surveys typically consider participation as a dichotomy (i.e., adoption vs. non-adoption), the level of participation in a given activity provides an important complement by which to better understand the processes involved in both the selection of specific activities and the degree to which selected activities are performed. It may be, for example, that the level of exercise

activity declines with age because older people adopt a smaller subset of available activities and not because of a decline in the level of participation in selected activities.

The purpose of the present study was to assess the regional and demographic determinants of the self-reported adoption and level of participation of specific exercise activities among U.S. Navy personnel. Although there are no extant data which address this issue, there are some limited descriptive data to suggest that males may be somewhat more likely than females to adopt more strenuous activities such as jogging and weightlifting (4). Because older people are generally less active than younger people, age may also be negatively associated with the adoption and/or level of participation in more strenuous activities (3). In addition, there are some data to indicate that males are more likely to participate in sports (9). Therefore, sex may be associated with the adoption of some team sports, such as basketball and baseball, in which social norms or limited facilities may inhibit the entry of females. Finally, region may present enhanced opportunities for participation in activities such as jogging, swimming, and racquet sports which can be performed outdoors in warm climates.

#### METHODS

##### Participants

Subjects were 2704 men and 334 women who had completed a "life-style" questionnaire as part of a Navy-wide longitudinal evaluation of the Navy's Health and Physical Readiness Program. Their average age was 28.3 years (S.D. = 7.0) with a range from 17-59 years. The majority of the sample was enlisted (88.4%), and the average educational level was 12.9 years (S.D. = 1.9). The median paygrade was E-5 with a range from E-1 to O-6. Of 2,750 individuals who identified their race/ethnic group, there were 80% Caucasian, 11% Black, 5% Hispanic/Puerto Rican, and 4% South Pacific Island. Participants were classified as living in one of seven regional areas based on duty assignment: (a) Northwest United States (12%), (b) Southwest United States (27%), (c) Northeast United States (11%), (d) Southeast United States (37%), (e) Midwest

United States (1%), (f) Foreign Region with Warm Climate (8%), and (g) Foreign Region with Cold Climate (4%).

### Procedures

Sampling Procedures. A two-step process was used to randomly select participants from the population of active duty Navy personnel. First, 119 command units were randomly selected from approximately 5,000 existing in the Navy. Second, computerized personnel tapes from the Naval Military Personnel Command were used to randomly select a maximum of 60 individuals from each of the 119 command units.

Data Collection Procedures. Points of contact (POCs) were provided for 110 of the 119 original units. Five transient personnel commands did not conduct the physical readiness test, a primary component of the overall longitudinal study; one submarine was decommissioned; one fighter squadron had conflicting operational demands; and one shore command and one aerial refueler squadron could not accommodate study requests. POCs for the 110 participating commands were asked to distribute and collect completed questionnaires from all of the identified participants at their respective commands.

### Questionnaire

The questionnaire included a broad range of items which addressed a variety of health- and fitness-related behaviors, attitudes, values, and perceptions. The subset of questionnaire items which addressed demographic factors, geographic region, and exercise behavior was assessed in this study. The demographic variables included Race (White, Black, South Pacific Islander, Hispanic, and Other), Education (Less Than High School Diploma, High School Diploma, Greater Than High School Diploma), Sex, and Age. Age, which was a continuous variable, was clustered into the following groups for analysis purposes (17-19, 20-29, 30-39, 40-49, 50-59). Duty station was classified into one of the seven geographic regions identified earlier. Weekly exercise behavior was assessed as the estimated frequency and duration of participation in each of ten types of physical activity. The recall method of assessing physical activity has demonstrated sufficient reliability and concurrent validity among college students; therefore, it was considered an acceptable

method in the present study (3). The physical activities were aerobic dance/exercise class, baseball, basketball, bicycling, calisthenics, continuous walking, jogging, racquet sports, swimming, and weightlifting.

The criterion for adoption of each exercise activity was developed by creating a dichotomy between those individuals who indicated their frequency of participation was never and those who indicated their frequency of participation was one time per month or greater. Among those individuals who had adopted an activity, the total estimated number of minutes of participation per week (frequency x duration) was used to develop a binary criterion for level of participation. A median split was used to divide the sample into a high level group and a low level group of approximately equal size.

#### RESULTS

Within each exercise activity, loglinear analyses (logit) were conducted to develop parameter estimates of demographic and regional variables associated with the adoption and the level of participation of the activity. Logit is a modified regression procedure for categorical data (5). A logit approach was also used to assess interaction effects and contrast effects within levels of the categorical variables.

Given the large sample size and the exploratory nature of the present study, only variables that indicated a significant relationship with the criterion (Chi Square of  $\leq .01$  and a phi or Cramers V of .1 or greater) were entered into a logit model. The alpha for reporting contrast effects of the logit model was set at .05 for two-tailed  $z$  tests of significance.

Adoption. Table 1 presents the proportion of people within each demographic and regional category who adopted each exercise activity. Table 1 also identifies those demographic and regional factors which met the initial statistical criterion for inclusion into the logit models.

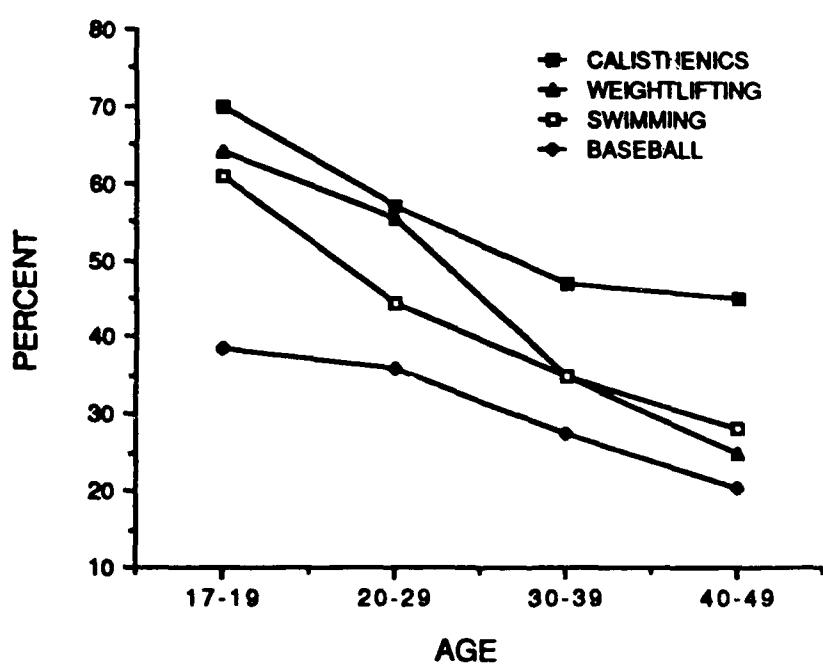
Table 1  
PROPORTION OF SAMPLE ADOPTING EXERCISE ACTIVITIES  
BY DEMOGRAPHIC AND REGIONAL GROUPS

	AEROBICS	BASKET-BALL	BASEBALL	CYCLING	CALISTHENICS	JOGGING	RACQUET SPORTS	SWIMMING	WALKING	WEIGHT-LIFTING
<b>SEX</b>	*	*	*			*				
MALE	.10	.33	.35	.39	.55	.70	.28	.42	.74	.49
FEMALE	.43	.09	.14	.42	.41	.54	.18	.36	.77	.36
<b>AGE</b>	*	*	*		*		*	*	*	*
17-19	.12	.49	.39	.31	.70	.86	.33	.61	.88	.64
20-29	.15	.35	.36	.38	.57	.69	.29	.45	.76	.56
30-39	.12	.23	.28	.43	.47	.65	.24	.34	.72	.35
40-49	.06	.15	.21	.39	.45	.66	.16	.28	.70	.25
<b>RACE</b>	*	*	*		*		*	*	*	*
WHITE	.11	.24	.32	.38	.53	.66	.29	.43	.73	.46
BLACK	.24	.66	.40	.44	.62	.77	.21	.28	.80	.61
SO. PACIFIC ISLAND	.18	.50	.27	.48	.43	.83	.24	.41	.82	.43
HISPANIC	.19	.35	.38	.37	.58	.72	.24	.41	.77	.53
<b>REGION</b>							*			
NORTHWEST U. S.	.15	.29	.30	.46	.49	.70	.34	.39	.74	.46
SOUTHWEST U. S.	.16	.33	.35	.39	.54	.72	.26	.40	.80	.51
NORTHEAST U. S.	.15	.29	.25	.42	.49	.63	.27	.28	.70	.45
SOUTHEAST U. S.	.11	.30	.34	.37	.55	.68	.26	.43	.73	.50
FOREIGN REG. - WARM	.16	.31	.32	.38	.53	.72	.24	.57	.79	.45
FOREIGN REG. - COLD	.24	.27	.34	.45	.52	.72	.27	.37	.66	.38
<b>EDUCATION</b>		*								
LESS THAN H. S.	.09	.24	.26	.31	.46	.57	.23	.49	.70	.41
HIGH SCHOOL	.12	.33	.36	.38	.56	.69	.26	.43	.77	.50
MORE THAN H. S.	.16	.26	.26	.45	.51	.70	.30	.36	.71	.44

\* $\chi^2 \leq .01$  and  $\phi$  or Cramer's  $V \geq .10$ .

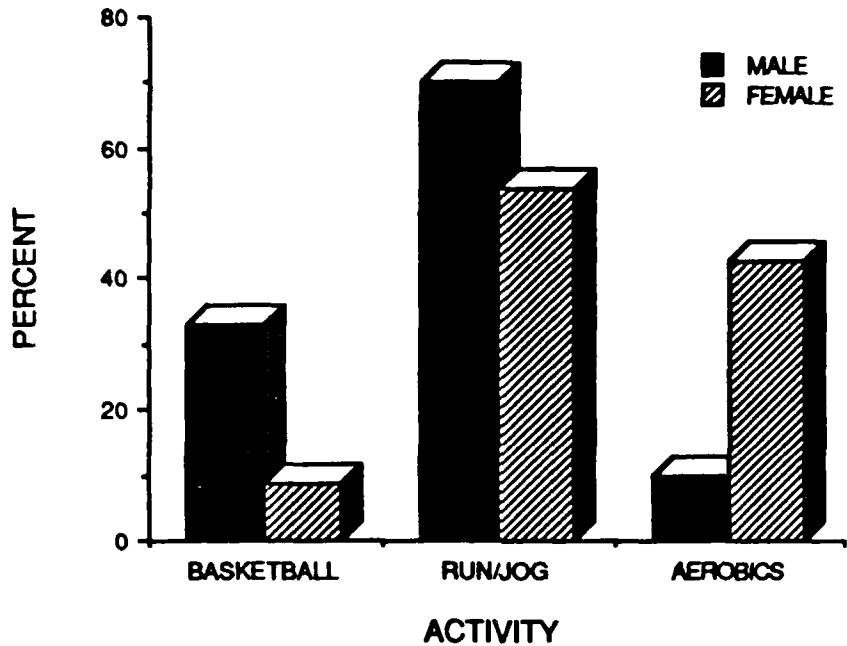
The following groups were not presented due to insufficient sample size: Age (50-59), Race (Other), Region (Midwest).

Contrast comparisons indicated that age had a differentially negative effect upon the adoption of calisthenics ( $p < .01$ ), weightlifting ( $p < .001$ ), swimming ( $p < .01$ ), and baseball ( $p < .001$ ) (Figure 1). As shown in Figure 2, men were more likely than women to play basketball ( $p < .01$ ) and to run or jog ( $p < .001$ ). Women, on the other hand, were more likely to do aerobics than men ( $p < .01$ ). Ethnic identity was a significant factor for the adoption of basketball and aerobic exercise. As shown in Figure 3, Blacks were more likely than Whites to play basketball and to do aerobics (both  $p < .001$ ).



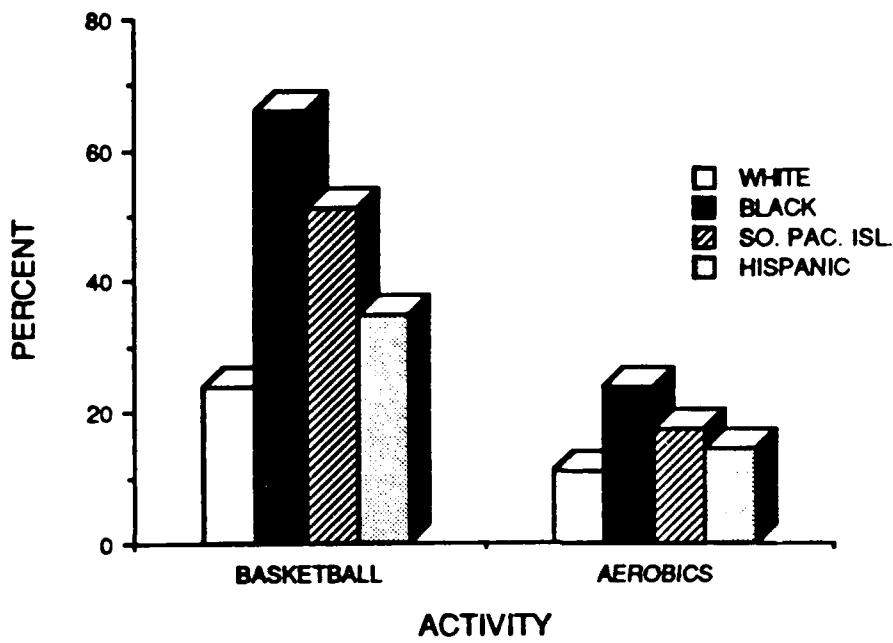
**Fig. 1. Adoption of exercise activity by age.**

Data from 50-59 year-olds were not presented because of insufficient sample size.



**Fig. 2. Adoption of exercise activity by sex.**

**Level of Participation.** Table 2 presents the proportion of individuals within each demographic and regional category who were classified as high level participants in each exercise activity. Table 2 also identifies the demographic and regional factors which met the initial statistical criterion for inclusion into the logit models.



**Fig. 3. Adoption of exercise activity by race.**

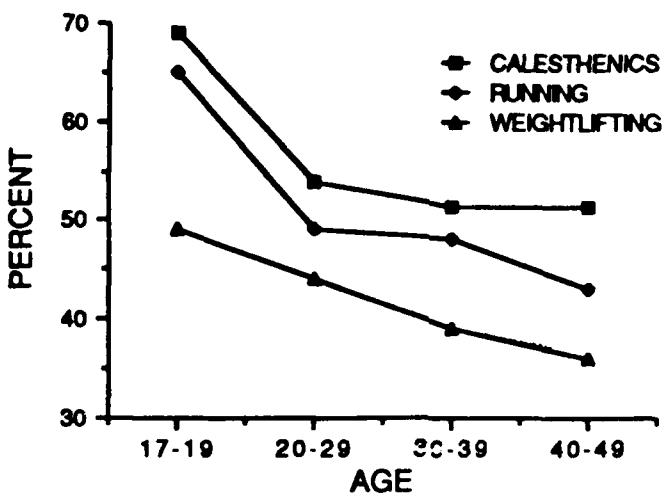
Contrast comparisons indicated that age had a differentially negative effect upon the level of participation in calisthenics ( $p < .05$ ), weightlifting ( $p < .05$ ), and running or jogging ( $p < .001$ ) (Figure 4). As shown in Figure 5, ethnic identity was associated with level of participation. Blacks played more basketball than whites and South Pacific Islanders ( $p < .001$ ), and Hispanics played more baseball than other ethnic groups ( $p < .05$ ). The only significant regional effect which emerged from the contrast comparisons in the logit analysis was that individuals in the Southwest U.S. spent more time walking ( $p < .05$ ) than individuals in other regions (Figure 6).

**Table 2**  
**PROPORTION OF SAMPLE PARTICIPATING IN HIGH LEVEL EXERCISE ACTIVITY**  
**BY DEMOGRAPHIC AND REGIONAL GROUPS**

	AEROBICS	BASKET-BALL	BASEBALL	CYCLING	CALISTHENICS	JOGGING	RACQUET SPORTS	SWIMMING	WALKING	WEIGHT-LIFTING
<b>SEX</b>										
MALE	.41	.41	.39	.53	.52	.49	.31	.39	.47	.47
FEMALE	.55	.24	.33	.48	.54	.48	.21	.35	.47	.38
<b>AGE</b>										
17-19	.73	.52	.38	.54	.69	.65	.31	.44	.61	.49
20-29	.47	.40	.38	.57	.54	.44	.27	.39	.49	.49
30-39	.44	.40	.41	.47	.49	.51	.33	.35	.44	.39
40-49	.40	.30	.26	.42	.43	.51	.57	.34	.34	.36
<b>RACE</b>										
WHITE	.45	.31	.37	.53	.53	.49	.30	.39	.46	.47
BLACK	.56	.61	.42	.52	.55	.48	.29	.43	.47	.45
SO. PACIFIC ISLAND	.47	.34	.19	.46	.38	.40	.28	.36	.37	.27
HISPANIC	.50	.44	.63	.52	.56	.54	.35	.20	.39	.46
<b>REGION</b>										
NORTHWEST U. S.	.49	.31	.32	.57	.51	.55	.20	.37	.41	.43
SOUTHWEST U. S.	.48	.40	.32	.53	.54	.49	.29	.33	.54	.48
NORTHEAST U. S.	.41	.49	.50	.46	.50	.46	.34	.33	.41	.49
SOUTHEAST U. S.	.52	.40	.37	.52	.55	.48	.35	.41	.46	.49
FOREIGN REG. - WARM	.43	.44	.47	.54	.47	.41	.33	.40	.44	.40
FOREIGN REG. - COLD	.26	.33	.53	.51	.42	.58	.28	.44	.41	.51
<b>EDUCATION</b>										
HIGH SCHOOL	.46	.41	.39	.53	.53	.44	.30	.39	.49	.47
MORE THAN H. S.	.50	.35	.37	.51	.51	.58	.30	.35	.39	.46

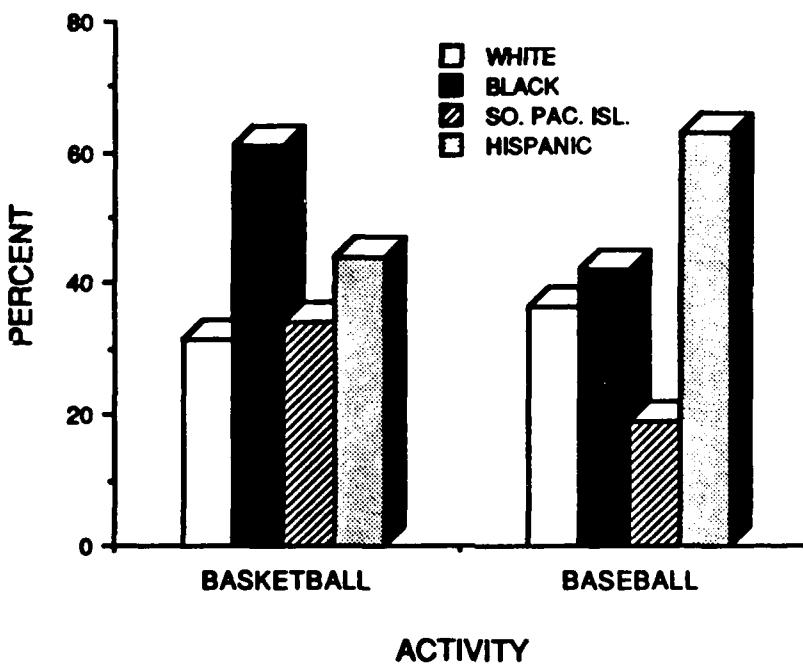
\* $\chi^2 \leq .01$  and  $\phi$  or Cramer's  $V \geq .10$ .

The following groups were not presented due to insufficient sample size: Age (50-59), Race (Other), Region (Midwest), Education (less than high school).



**Fig. 4. Percent of high level participation by age.**

Data from 50-59 year-olds were not presented because of insufficient sample size.



**Fig. 5. Percent of high level participation by race.**

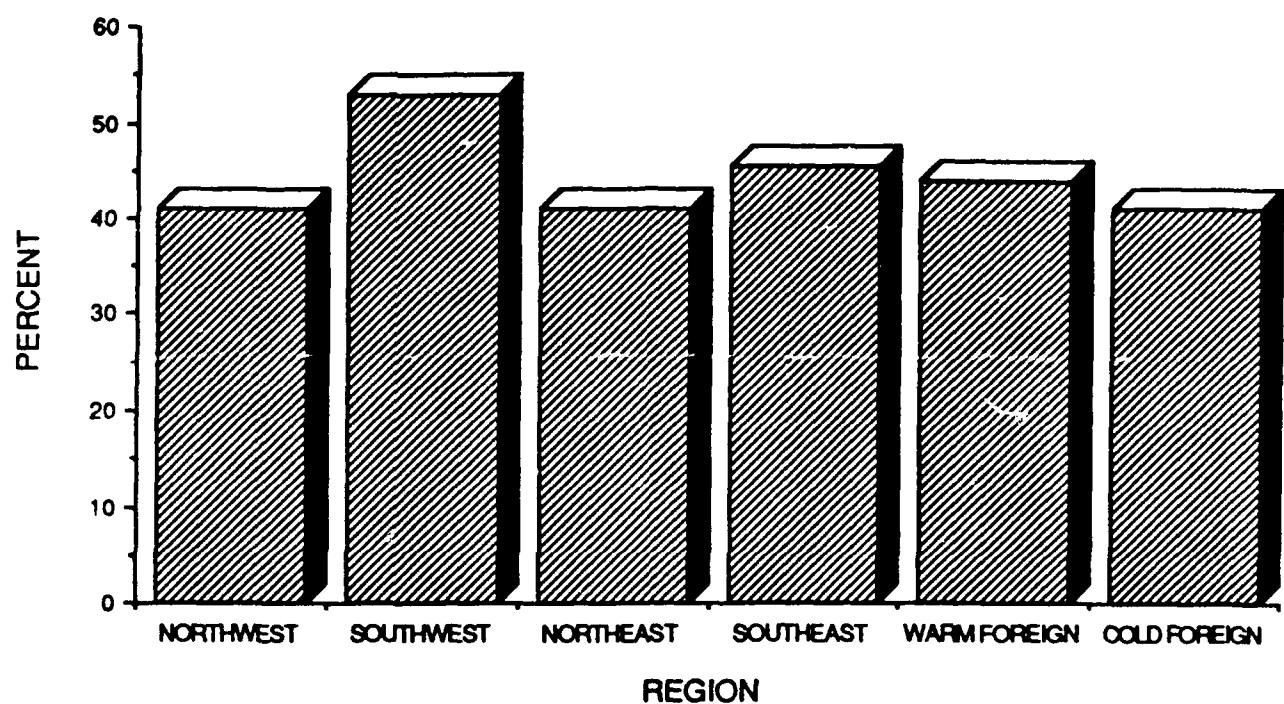


Fig. 6. Percent of high level participation in walking by region.

## DISCUSSION

Demographic and regional factors were significantly associated with the majority of specific exercise activities. Interestingly, however, different factors were often associated with the adoption versus the level of participation in a given activity. This finding supports the position of Dishman and his colleagues (3) that while several factors have shown a fairly generalized relationship with overall activity, different determinants exist for different behaviors or parameters of exercise activity (e.g., adoption, level of participation, maintenance, etc.).

Results of the present study indicated that age was negatively associated with both the adoption and level of participation in body building activities such as weightlifting and calisthenics. Older people were also less likely to adopt swimming and baseball; but, among those who participated, age did not significantly predict the level of participation. Age was not significantly associated with the adoption of jogging as an exercise activity; however, among joggers, younger people participated to a significantly greater degree. Although these effects were not completely linear and they varied across activities, the results were generally consistent with previous findings that activity declines with age (9,2,10,1,6). The generally negative effect of age within relatively strenuous activities suggests some support for a biological interpretation in terms of physiological limitations (7). Alternatively, these effects may have been moderated by age-related goals for exercise activity. Older people, for example, may participate in less strenuous activities to maintain health, while younger people may participate in more strenuous activities to build muscle mass or maximize cardiorespiratory endurance.

Although sex differences were anticipated in the adoption and level of participation in more strenuous activities and team sports, this was only partially supported. The only sex differences which emerged were that men more frequently adopted basketball and jogging, and women more frequently adopted aerobic exercise. Because both jogging and aerobic exercise enhance cardiorespiratory endurance, these sex differences probably reflect socially approved or normative approaches to achieve a common goal of physical fitness.

The general absence of significant sex differences in the adoption and level of participation in most exercise activities in the Navy may be due, in part, to the fact that all personnel are required to participate regularly in a common set of physical fitness tests. Although some performance standards are age- and sex adjusted, physical fitness tests require a common set of physical attributes such as muscular endurance, cardiorespiratory endurance, and flexibility. These commonalities in performance requirements in the U.S. Navy may thus serve to attenuate sex differences in exercise behavior.

The effects of geographic region upon exercise activity were modest in the present study. The only significant finding which emerged from the contrast comparisons was that among those who walked for exercise, Navy personnel in the Southwestern U.S. walked more than those in other regions. This finding suggests that regional differences in exercise activity reported in national surveys of the civilian sector may be attributable to socioeconomic or socialization factors rather than climate per se. It is also interesting to note that educational level was not associated with exercise adoption or level of participation in the present investigation. The absence of this effect may be attributable to the relatively restricted range of education in the Navy sample. Alternatively, educational effects upon exercise activity in the civilian sector may be largely due to differential opportunities to participate in vocational and recreational activities. Data from the present study are not sufficient to discriminate between these, or other, alternative explanations.

The pattern of results in the present study further suggested that specific exercise activities were preferred by certain ethnic groups. For example, Blacks were more likely than Whites to play basketball and to do aerobics. Moreover, among those who had adopted a given activity, Blacks indicated the highest level of participation in basketball, and Hispanics indicated the highest level of participation in baseball. While the specific mechanisms underlying the above differences were not assessed in the present study, research on ethnic differences in the United States suggests that future studies investigate the importance of role modeling, "self" versus "other" orientation, communication styles, sex role socialization, and sports as an alternative opportunity structure.

Due to the exploratory nature of the present study, relatively stringent statistical criteria were used to identify only the strongest effects that could serve as firm guideposts for future research. Given this approach, none of the interactions between the demographic and regional categories were significant at the two-tail level, although many were significant at the one-tail level and may emerge as significant factors in future research. Nevertheless, the results of this study have identified some demographic and regional factors associated with the adoption and the level of participation in specific exercise behaviors. That fact will stimulate theoretical interest but may ultimately have its greatest impact in the development of exercise intervention programs for particular groups. The most efficient programs will probably be those which promote exercise activities which are consistent with normative group preference patterns.

#### References

1. Canada Fitness Survey. Fitness and life-style in Canada. Fitness Canada, Ottawa, 1983.
2. Dishman, R. K., J. F. Sallis, and O. R. Orenstein. The determinants of physical activity and exercise. *Public Health Rep.* 100:158-172, 1985.
3. Dishman, R. K., and M. Steinhardt. Reliability and concurrent validity for a 7-day recall of physical activity in college students. *Med. Sci. Sports Exerc.* 20:14-25, 1988.
4. Exercise and participation in sports among persons 20 years of age and over, United States, 1975. Advancedata No. 19, National Center for Health Statistics. U.S. Government Printing Office, Washington, DC, 1978.
5. Goodman, L.A. A modified regression approach to the analysis of dichotomous variables. *Am. Soc. Rev.* 37:28-46, 1972.
6. Nice, D. S., and T. L. Conway. Exercise patterns in the U.S. Navy. Naval Health Research Center Technical Report No. 88-1, Naval Health Research Center, San Diego, CA, 1988.
7. Santrock, J. W. Adult development and aging. Dubuque, IA, Wm. C. Brown, 1985.
8. Slater, C. H., L. W. Green, S. W. Vernon, and V. M. Keith. Problems in estimating the prevalence of physical activity from national surveys. *Prev. Med.* 16:107-118, 1987.
9. Stephens, T., D. R. Jacobs, and C. C. White. A descriptive epidemiology of leisure-time physical activity. *Public Health Rep.* 100:147-158, 1985.
10. Perrier-Great Waters of France, Inc., The Perrier study: fitness in America. New York, 1979.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION Unclassified		1b RESTRICTIVE MARKINGS None	
2a SECURITY CLASSIFICATION AUTHORITY N/A		3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited	
2b DECLASSIFICATION/DOWNGRADING SCHEDULE N/A		5 MONITORING ORGANIZATION REPORT NUMBER(S)	
4 PERFORMING ORGANIZATION REPORT NUMBER(S)  NHRC Report No. 88 - 19		6a NAME OF PERFORMING ORGANIZATION Naval Health Research Center	
		6b OFFICE SYMBOL (If applicable) 40	7a NAME OF MONITORING ORGANIZATION Commander, Naval Medical Command
6c ADDRESS (City, State, and ZIP Code) P.O. Box 85122 San Diego, CA 92138-9174		7b ADDRESS (City, State, and ZIP Code) Department of the Navy Washington, DC 20372	
8a. NAME OF FUNDING SPONSORING ORGANIZATION Naval Medical Research & Development Command	8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Naval Military Personnel Command Reimbursable Doc# N0002288WRWW508, Appro. 1781804	
8c. ADDRESS (City, State, and ZIP Code) Naval Medical Command National Capital Region Bethesda, MD 20814-5044		10. SOURCE OF FUNDING NUMBERS	
13a. TYPE OF REPORT Interim	13b TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1988, March, 28	15 PAGE COUNT 19
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>Although reliable information regarding participation in specific exercise activities would appear central to the formulation, implementation and evaluation of health promotion policies, little is known of the determinants of participation in specific exercise behaviors. The present study collected questionnaire information from a Navy-wide, random sample of 3038 active duty personnel to identify demographic determinants of the adoption and level of participation in 10 common exercise activities. Results indicated that older people less frequently adopted more strenuous activities. Men were more likely than women to play basketball and jog, while women were more likely to engage in aerobics. Blacks were more likely to play basketball and to do aerobics. Among those people who participated in a given activity, older people participated in strenuous activities to a lesser degree. Blacks played more basketball and Hispanics played more baseball. It was argued that the most efficient health promotion programs would be those that promoted the group-specific activities consistent with normative group preference patterns.</p>			
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL D. Stephen Nice, Ph.D.		22b TELEPHONE (Include Area Code) (619) 553-8463	22c. OFFICE SYMBOL Code 40